

REMARKS

New claims 31 to 38 have been added. Support for those claims can be found throughout the Specification. Claims 16, 17, 23 and 26 have been amended. No new matter has been added.

Claims 16 to 38 are now pending in the present application.

Applicants request reconsideration of the present application in view of this response.

Allowable Claim(s)

Applicants thank the Examiner for indicating that claim 17 would be allowable if rewritten in independent form. While Applicants believe that all the claims are allowable, claim 17 has been rewritten in independent form, in accordance with the Examiner's recommendation. No new matter has been added. New claims 31 to 38 depend from claim 17 and are allowable for at least the same reasons as claim 17. Support for the new claims can be found throughout the Specification. No new matter has been added.

35 U.S.C. § 112, second paragraph

Claims 16 to 30 were rejected under 35 U.S.C. § 112, second paragraph, for indefiniteness. Specifically, the Office Action requests clarification of the "in a path of rays..." section of claims 1 and 26. Applicants respectfully note that claim 1 has been canceled. While Applicants believe that claims 16 to 30 are allowable, Applicants have amended claims 16 and 26 above to improve the grammar and readability of the claim -- thus, further clarifying the claims to read: "in a path of rays of a light beam to be modulated; and directions of the fast optical axes and slow optical axes, respectively, of the at least two liquid crystal layers are rotated relative to one another so that a polarization of the light beam upstream of the modulator is the same as a polarization of the light beam downstream of the modulator." No new matter has been added. Applicants thank the Examiner for noting that claim 23 stated "FLC-472/FLC-247" -- accordingly, Applicants have amended claim 23 by replacing "FLC-472/FLC-247" with actual descriptions from the Specification. No new matter has been added. The remaining claims appear rejected for being dependent on a rejected base claim. Applicants respectfully submit that all claims 16 to 30, as amended above, are now in condition for allowance. Withdrawal of the rejection of claims 16 to 30

under 35 U.S.C. § 112, second paragraph, is respectfully requested.

35 U.S.C. § 102(b)

Claims 16, 20 to 22, 26, 29, and 30 were rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 5,168,361 to Walba (“Walba reference”).

The Walba reference purportedly concerns a switchable light valve having two transmission states, including two or more chiral smectic liquid crystal cells aligned sequentially along a light path. The Walba reference appears to concern switching between two transmission states, which results in switching between a dark and a bright transmission state.

Claim 16 is directed to an electrically drivable light modulator having at least two liquid crystal layers for enclosing between at least two transparent plates having a surface anisotropy for orienting molecules of the at least two liquid crystal layers and having electrodes for generating an electric field in the at least two liquid crystal layers. Claim 16 further recites that the at least two liquid crystal layers include helical, smectic, ferroelectric liquid crystals, whose fast optical axes and slow optical axes, respectively, are disposed in parallel with a respective one of the at least two liquid crystal layers, and whose average optical anisotropy is influenceable by an action of the electric field. Claim 16 further recites that the at least two liquid crystal layers are situated one behind another in a path of rays of a light beam to be modulated; and directions of the fast optical axes and slow optical axes, respectively, of the at least two liquid crystal layers are rotated relative to one another so that a polarization of the light beam upstream of the modulator is the same as a polarization of the light beam downstream of the modulator.

In contrast, the Walba reference does not describe identically (as it must for anticipation) or suggest the features of the at least two transparent plates having a surface anisotropy for orienting molecules of the at least two liquid crystal layers and having electrodes for generating an electric field in the at least two liquid crystal layers; the crystal’s fast optical axes and slow optical axes, respectively, are disposed in parallel with a respective one of the at least two liquid crystal layers; and directions of the fast optical axes and slow optical axes, respectively, of the at least two liquid crystal layers are rotated relative to one another so that a polarization of the light beam upstream of the modulator is the same as a

polarization of the light beam downstream of the modulator, as in amended claim 16. Instead, the Walba reference appears to suggest that the cells position between an entrance polarizer and an exit polarizer such that the cells are half-wave plates and oriented with respect to each other such that in the first transmission state the optic axes of all cells are either parallel or perpendicular to each other and to the plane of polarization of light, and in the second transmission state the optic axes of sequential cells along the light path rotate in opposite directions. The Walba reference refers to various tilt angles, but does not suggest or identically describe all of the features of amended claim 16. Accordingly, Applicants respectfully submit that amended claim 16 is allowable. Amended claim 26 has features analogous to those of claim 16 and is therefore allowable for essentially the same reasons as claim 16. The remaining rejected claims 20 to 22, 29 and 30 depend from either amended claim 16 or amended claim 26 and is allowable for the same reasons as amended claim 16 or amended claim 26. Withdrawal of the rejection under 35 U.S.C. § 102(b) over the Walba reference is respectfully requested.

35 U.S.C. § 103(a)

Claims 18, 19 and 27 were rejected under 35 U.S.C. § 103(a) as unpatentable over the Walba reference.

As discussed above, the Walba reference does not suggest all the features of amended claim 16 or claim 26. Since claims 18, 19 and 27 depend from one of claim 16 or claim 26, claims 18, 19 and 27 are also allowable over the Walba reference for at least the same reasons as for claim 16 or claim 26. Withdrawal of the 35 U.S.C. § 103(a) rejection of claims 18, 19 and 27 over the Walba reference is respectfully requested.

Claims 23 to 25 were rejected under 35 U.S.C. § 103(a) as unpatentable over the Walba reference in view of U.S. Patent No. 5,326,498 to Kelly (“Kelly reference”).

As discussed above, the Walba reference does not suggest all the features of amended claim 16. Since claims 23 to 25 depend from amended claim 16, they are allowable over the Walba reference for at least the same reasons as for claim 16. Notably, the claims were rejected over the Walba reference in view of the Kelly reference, thus, a review of the Kelly reference is needed.

The Kelly reference purportedly concerns liquid crystal mixtures including aromatic

esters. That is, the Kelly reference does not appear to suggest or describe the features of claim 16, but instead appears to concern itself solely with a listing of compounds which are “extremely suitable” for liquid crystal mixture. However, the Office Action suggests that the Kelly reference does disclose the composition as claimed in Applicants’ claims 23 to 25, except that the Kelly reference suggests a different ratio. Thus, not only does the Kelly reference not suggest or describe the features apparently missing from the Walba reference, namely, the features of the at least two transparent plates having a surface anisotropy for orienting molecules of the at least two liquid crystal layers and having electrodes for generating an electric field in the at least two liquid crystal layers; the crystal’s fast optical axes and slow optical axes, respectively, are disposed in parallel with a respective one of the at least two liquid crystal layers; and directions of the fast optical axes and slow optical axes, respectively, of the at least two liquid crystal layers are rotated relative to one another so that a polarization of the light beam upstream of the modulator is the same as a polarization of the light beam downstream of the modulator; as in amended claim 16 (from which claims 23 to 25 depend); but the Kelly reference does not even disclose the chemical ratio of the claims 23 to 25. Applicants respectfully submit that it would not have been obvious to one of ordinary skill in the art to supplement the deficient Walba reference with the various missing features, and the claimed ratios in claims 23 to 25. The Office Action’s suggested 27-73 ratio (Applicants did not derive this ratio from the Kelly reference) is different from the claimed ratio 40-60 and not obvious to one of ordinary skill in the art. In fact, the amount of the smectic C matrix, as in claim 25, in the present application is almost 50% greater than the amount apparently used in the Kelly reference (according to the Office Action). And, the amount of the phenyl pyrimidine, as in claim 25, in the present application is almost 6% less than the amount apparently used in the Kelly reference (according to the Office Action). These are not negligible amounts.

Accordingly, Applicants respectfully submit that claims 23 to 25 are allowable over the Walba reference in view of the Kelly reference. Withdrawal of the rejection under 35 U.S.C. § 103(a) of claims 23 to 25 is respectfully requested.

Claim 28 was rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 5,978,053 to Giles et al (“Giles reference”) in view of the Walba reference.

The Giles reference purportedly concerns an apparatus and method for characterizing

light beams collimation and alignment using a liquid crystal device. The Giles reference refers to using a liquid crystal device for receiving a light beam from a collimation lens having a lenslet array generated thereon; and, a corresponding array of point spread functions are detected by a charge coupled device camera from which light beam collimation and alignment are characterized.

The Walba reference is described above. As discussed above, the Walba reference does not suggest or describe all of the features of amended claim 26 and thus, claim 28 (which depends from amended claim 26).

The Giles reference also, when taken in combination with the Walba reference, does not suggest or describe the features missing from the Walba reference, namely, the features of the at least two transparent plates having a surface anisotropy for orienting molecules of the at least two liquid crystal layers and having electrodes for generating an electric field in the at least two liquid crystal layers; the crystal's fast optical axes and slow optical axes, respectively, are disposed in parallel with a respective one of the at least two liquid crystal layers; and directions of the fast optical axes and slow optical axes, respectively, of the at least two liquid crystal layers are rotated relative to one another so that a polarization of the light beam upstream of the modulator is the same as a polarization of the light beam downstream of the modulator. Instead, the Giles reference appears to concentrate on the arrays of point spread functions in order to characterize a light beam collimation and alignment, and in order to possibly correct misalignment based on such characterization.

Accordingly, Applicants respectfully submit that claim 28 is allowable over the Walba and Giles references, taken alone or in combination. Withdrawal of the rejection under 35 U.S.C. § 103(a) over the Giles reference in view of the Walba reference of claim 28 is respectfully requested.

In summary, it is respectfully submitted that all of claims 16 to 38 of the above-identified application are allowable for the foregoing reasons.

CONCLUSION

In view of the foregoing, it is believed that the objection to claim 17 and the rejection of claims 16 and 18 to 30 have been obviated or overcome. Accordingly, it is respectfully submitted that all claims 16 to 38, as presented, are now allowable. It is therefore respectfully requested that the objections and/or rejections be reconsidered and withdrawn, and that the present application issue as early as possible.

If it would further allowance of the present application, the Examiner is invited to contact the undersigned at the contact information given below.

Respectfully submitted,

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Dated April 15, 2004

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